

THE PAPER TOWER

The Paper Tower is the controlling mechanism of the Caster. In it is placed the paper ribbon prepared at the Keyboard by the operator and this ribbon compels the Casting Machine to produce the characters required in properly justified lines. The Keyboard operator, therefore, regulates the matter the Caster shall produce, and the Caster operator is responsible for the Quality and Quantity of the type it makes. The functions of the Tower are: First, to feed the paper to the point of application of the air, winding it up as it is used; and second, to supply air as required to this point of application, and transmit it to the portions of the machine designated by the perforations in the ribbon.

The paper is fed by means of its marginal perforations, with which the perforations made by the Keyboard Punches, to determine the character or space required, must line. The ribbon is advanced one marginal perforation for every revolution of the machine. The Tower mechanism provides that the advance of the paper will be absolute; that it will be locked in position while the air is being transmitted to the points it designates and that it may never advance more than a single hole at a time. The marginal perforations pass over the Pins in the Pin Wheels, and, as the paper passes under the Air Bar, the lift of which is less than the height of the Pins, the paper cannot be disengaged from the Pin Wheels. The ribbon is advanced by the Pin Wheel Ratchet and for every tooth the Ratchet moves the paper is advanced one perforation.

The movement of the Ratchet is controlled by two Pawls, the Paper Feed Locking Pawl and the Paper Feeding Pawl; one or the other of these Pawls is always fully in mesh with the Ratchet. The Locking Pawl is fulcrumed upon the Air Pin Wheel Pins directly in line with the holes in the Air Tower Cross Girt. The Feeding Pawl is fulcrumed upon the Paper Feed Pawl Ring; this Pawl is, therefore, capable of oscillating about its Fulcrum Screw, and, in addition, of moving with the Pawl Ring. The Ring is mounted upon the Housing and held to it under spring pressure by the Screws so that it may oscillate through a limited distance. This movement is checked by the Stop Screw, against one of which the Lug on the Ring strikes at each end of its stroke. To the Locking Pawl is attached the Feeding Pawl Operating Link and this is connected with the Feeding Pawl by the Connecting Links. The Pawl Spring connects the two Pawls and draws their teeth together.

The entire Tower is operated by the Paper Tower Cams, which move the Paper Tower Cam Lever. The movement of the Cam Lever is transferred to the Paper Tower Operating Lever, by the Paper Tower Operating Rod. The Tower Lever rises while the Worm Shaft Gear is turning from zero to sixty degrees, and descends while the Gear rotates from sixty to one hundred and fifty. Thus, the Tower performs its complete function, feeding the paper and raising the Air Pins thirty-five degrees before the Pin Jaws start to close. By means of the Paper Feed Spring Box, the movement of the Paper Tower Lever is transferred to the Locking Pawl Operating Link. As the Paper Tower Lever rises, the left end of the Operating Link lifts and the right end falls, setting the Locking Pawl in the ratchet. As soon as the Pawl is seated, its connection with the Operating Link becomes the fulcrum about which this Link moves; that is, the right hand of this Link becomes stationary and the left end rises. As it rises, it lifts the Feeding Pawl out of the Ratchet until this Pawl strikes against the Stop Pin in the Paper Pawl Ring. The further upward movement of the Operating Link therefore, rotates the Paper Feed Pawl Ring until its lug strikes against the left hand Stop Screw in the front housing. Any further movement of the Paper Tower Lever is now absorbed by the Pawl Spring Box.

When the Paper Tower Lever starts to move down, at sixty degrees the left hand end of the Locking Pawl Operating Link descends, the right end being held stationary by the Pawl Spring, this seats the Feeding Pawl in the Ratchet. As soon as this Pawl seats, the fulcrum of the Locking Pawl Operating Link shifts from its right end to its connection with the Feed Pawl Links; that is, the further movement down of the left end of the Locking Pawl Operating Link lifts the Locking Pawl out of the Ratchet, raising it until it strikes the Paper Feed Locking Lever. Throughout the lifting of the Locking Pawl the Feeding Pawl is held in the Ratchet both by the downward pressure upon the left end of its connecting Links, and by the tension of the Pawl Spring. As soon as the Locking Pawl strikes the Paper Feed Locking Lever, the fulcrum of the Feeding Pawl Operating Link shifts back from its connection with the Feeding Pawl Links to its original position, its connection with the Locking Pawl. Further downward movement of the left end of the Operating Link now causes the Pawl Ring to rotate, carrying the Feeding Pawl with it, and consequently rotating the Ratchet until the lug on the Pawl Ring strikes the right hand Stop Screw in the housing; further downward movement of the Paper Tower Lever is absorbed by the Spring Box.

When it is desired to repeat the same letter several times in casting sorts, the Paper Feed Locking Lever is lowered so that its cam holds the Locking Pawl seated in the Ratchet. The paper cannot then feed, and the entire movement of the Paper Tower Lever is absorbed by the Spring Box.

The paper, as fed from the Pin Wheels, is wound upon the Winding Spool by the Winding Spool Driving Ratchet. This Ratchet is operated by the Driving Ratchet Pawl, fulcrumed upon the Pawl Arm which is moved by the Pawl Arm Operating Finger attached to the Paper Tower Operating Rod. As the Operating Rod rises, it lifts the Ratchet Pawl Arm to the top of its stroke. In this position, the Pawl is engaged in the Ratchet by the Winding Spool Operating Spring and, as the Operating Finger descends, the paper is wound on the Winding Spool by the tension of this Spring.

The Winding Spool is so arranged that it may be quickly removed from the machine, to throw off the completed roll of paper, and replaced ready for the next roll. To remove the Spool, the Spool Spring Box Plunger Button is moved to the left and given a quarter turn. This disengages the Plunger, about which the rear end of the Spool rotates. The movement of this Pin enables a Spring in the Spool to withdraw into the Spool a similar Pin, which supports the front end of the Spool. The Spool may then be lifted from the Paper Tower and the Ribbon slid off. When the Spool is dropped back into place it is positioned by the Winding Spool Guide, so that, when the Button is turned and its tongue drops in the groove in the Spring Box, the Spring Box Plunger, or Pin about which the rear end of the Spool rotates, enters the rear end of the Spool. At the same time the Plunger forces the Pin at the front end, into a hole in the Winding Spool Driving Disc Shaft, to which the Winding Spool Ratchet is attached. To the rear end of this Shaft is riveted the Winding Spool Driving Disc which is engaged by the Driving Disc Shaft; the rotation of the Ratchet, therefore, causes the Spool to rotate with it. The paper is caught under the Winding Spool Paper Holding Spring to prevent its slipping.

To insure that the paper be held at all times in contact with the Cross Girt, the Paper Tension Bars are provided. The Arms which carry these Bars are so connected that, when the Air Bar Clamping Lever Stud is disconnected from the Connecting Rod Connecting Hook and the Clamping Lever is raised, to remove the paper ribbon, the Paper Tension Bars are lifted automatically with it and held out of position as long as the Clamping Lever is thrown back to the right.

The Air Bar is provided with a Leather Packing in which an air channel is cut so that it comes over the holes in the Cross Girt, when the Air Bar is clamped against the Girt. When the paper is placed in position for the next character, by the feeding of the Pin Wheels, the Air Bar is forced down, clamping the paper against the Cross Girt. Air is then admitted to the channel in the Leather Packing and passes through the holes in the paper to the holes in the Cross Girt directly below them. The method of operating the Air Bar and admitting air to it is as follows.

The Air Bar is connected to the Air Bar Clamping Lever by means of the Air Bar Spring Studs. As the Clamping Lever descends, it forces the Air Bar against the Cross Girt by means of the Air Bar Springs. When the Bar is seated, the further downward movement of the Clamping Lever permits the Valve Operating Screw, in the rear end of the Clamping Lever to strike the Air Bar Valve and depress it, admitting air to the channel in the Air Bar Leather Packing. Air is supplied to the Air Bar Valve by means of the passage in its rear arm. This end of the Bar is clamped, by the Air Bar Clamp Screw, to the Air Bar Shaft, so that the hole in the Air Bar arm connects with a hole in the center of the Air Bar Shaft parallel to its axis. The Air is supplied to this hole in the Air Bar Shaft by means of the Air Supply Pipe Connection which is coupled to the Air Supply Pipe.

The movement of the Air Bar Clamping Lever and consequently the Air Bar and its Valve, is affected as follows. The Air Bar Clamping Lever Stud connected with the Connecting Rod Connecting Hook on the upper end of the Connecting Rod is lifted by the Connecting Rod Spring and moved down by the Paper Tower Lever which carries the Stud, working in the slot in the Connecting Rod Connecting Link. As the Paper Tower Lever rises the Rod Spring lifts the Air Bar Clamping Lever until the Air Bar is unclamped from the Cross Girt and raised from it. Further upward movement of the Air Bar Clamping Lever is checked by the Connecting Rod Tube coming in contact with the lug on the Air Tower Housing. As the Paper Tower Lever descends, the paper feed takes place as described. Just after the paper has finished feeding, the Stud in the Paper Tower Lever strikes the bottom of the slot in the Connecting Rod Connecting Link, causing the Air Bar to clamp the paper to the Cross Girt and, after the paper is clamped, to admit air to the Air Bar Channel, by opening the Operating Valve as described.

The Air Tower Cross Girt is provided with thirty-one holes connected to the Air Pipes which lead to the different portions of the machine. Fourteen of these Pipes lead to the B and C Pin Blocks respectively and three to the D Block. If we designate the Pins in the B Block by the numbers of the Unit Rows to which they correspond; that is, if we consider the Pins from right to left to be numbered as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and if we consider the Pins in the C Block to be designated by the letters of the alphabet from A to N inclusive, A being the front Pin, and if we further designate the middle, or space air pin in the Justification Block by the letter S, and the right hand Pin, which operates the rear Wedge by .0005", which is the fraction of an inch each position of this Wedge to the right increases the justifying space; the left hand pin in the same Block, which operates the front wedge, by .0075" for the same reason, the location of the holes in the Cross Girt from back to front would be as follows: N, M, L, K, J, I, H, G, F, S, E, D, .0075", C, B, A, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, .0005".